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| 10/632,052 | 07/30/2003 | James Chingwei Li | 01SC038US8 | 9959 |

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EXAMINER

ORTIZ, EDGARDO

| ART UNIT | PAPER NUMBER |
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2815

DATE MAILED: 03/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/632,052

Applicant(s)

LI ET AL.

Examiner

Edgardo Ortiz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shigematsu et al.

(U.S. Patent No. 6,399,971) in view of Hébert (U.S. Patent No. 4,654,687). With regard to Claim

1, Shigematsu teaches a semi-insulating substrate (10), a sub-collector (12) formed on said substrate, a collector (14) formed on said sub-collector, a first metal contact (36) on said sub-collector, which provides a collector contact for a BJT, a base (16) formed on said collector, an emitter (18) formed on said base, a second metal contact (20, 22) on said emitter, which provides an emitter contact for said BJT, an inter-level dielectric (28) on said emitter contact (column 5, lines 60-67) and a via through said inter-level dielectric layer which provides access to said emitter contact (figure 2C), being square-shaped and centered over a center point of a central area.

However, Shigematsu fails to teach a cross-shaped metal contact on the emitter comprising two perpendicular arms, which intersect at a central area, the width of said arms being equal to X μm .

Hébert discloses a high-frequency bipolar transistor structure which includes an emitter (1)

having a metal contact, wherein the metal contact comprises a cross-shaped structure (column 6,

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lines 5-37 and figures 5 & 6). Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Shigematsu to include a cross-shaped metal contact on the emitter comprising two perpendicular arms, which intersect at a central area with a desired width of the arms, as suggested by Hébert, in order to yield lower emitter resistances (column 6, lines 37-41).

With regard to Claim 2, the limitation “*said fabrication process has a minimum alignment tolerance, said square shaped via sized as large as possible while maintaining said minimum alignment tolerance with respect to the boundaries of said emitter contact*”, is an intended use limitation which does not structurally or patentably distinguish the claimed invention from that taught by the cited prior art.

With regard to Claim 3, Shigematsu teaches a semi-insulating substrate (10) comprising indium phosphide (InP). See column 4, line 52.

With regard to Claim 4, Shigematsu teaches a semi-insulating substrate (10) that is a compound substrate (InP). See column 4, line 52.

With regard to Claim 5, a further difference between Shigematsu and the claimed invention is the arms of the emitter contact being generally rectangular, having respective center points, of approximately equal length and intersect at their respective center points. Hébert discloses a high-frequency bipolar transistor structure, which includes an emitter (1) having a metal contact,

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wherein the metal contact comprises a cross-shaped structure (column 6, lines 5-37 and figures 5 & 6) comprising arms which are generally rectangular, have respective center points, are of approximately equal length and intersect at their respective center points. Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Shigematsu to include arms of the emitter contact being generally rectangular, having respective center points, of approximately equal length and intersect at their respective center points, as suggested by Hébert, in order to yield lower emitter resistances (column 6, lines 37-41).

With regard to Claim 6, Shigematsu teaches a sub-collector (12) comprising indium gallium arsenide (InGaAs). See column 4, line 51.

With regard to Claim 7, Shigematsu teaches a collector (14) comprising indium gallium arsenide (InGaAs). See column 4, lines 52-54.

With regard to Claim 8, Shigematsu teaches a base (16) comprising indium gallium arsenide (InGaAs). See column 4, lines 54-55.

With regard to Claim 9, Shigematsu teaches a base (16) comprising indium gallium arsenide (InGaAs) and having a base contact comprising gallium arsenide antimonide (GaAsSb). See column 4, lines 64-65.

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With regard to Claim 10, Shigematsu teaches an emitter (18) comprising indium phosphide (InP). See column 4, lines 55-56.

With regard to Claim 11, Shigematsu teaches a semi-insulating substrate (10) that is a compound semiconductor (InP) and the BJT structure is arranged to form a heterojunction bipolar transistor (HBT). See column 1, lines 65-66 and column 2, lines 1-2.

With regard to Claim 12, Shigematsu teaches a semi-insulating substrate (10), a sub-collector (12) formed on said substrate, a collector (14) formed on said sub-collector, a first metal contact (36) on said sub-collector, which provides a collector contact for a BJT, a base (16) formed on said collector, an emitter (18) formed on said base, a second metal contact (20, 22) on said emitter, which provides an emitter contact for said BJT, an inter-level dielectric (28) on said emitter contact (column 5, lines 60-67) and a via through said inter-level dielectric layer which provides access to said emitter contact (figure 2C), being square-shaped and centered over a center point of a central area.

However, Shigematsu fails to teach a cross-shaped metal contact on the emitter comprising two perpendicular arms, which intersect at a central area, the width of said arms being equal to $X \mu\text{m}$. Hébert discloses a high-frequency bipolar transistor structure which includes an emitter (1) having a metal contact, wherein the metal contact comprises a cross-shaped structure (column 6, lines 5-37 and figures 5 & 6). Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by

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Shigematsu to include a cross-shaped metal contact on the emitter comprising two perpendicular arms, which intersect at a central area with a desired width of the arms, as suggested by Hébert, in order to yield lower emitter resistances (column 6, lines 37-41).

Furthermore, the limitation “*said fabrication process has a minimum alignment tolerance, said square shaped via sized as large as possible while maintaining said minimum alignment tolerance with respect to the boundaries of said emitter contact*”, is an intended use limitation which does not structurally or patentably distinguish the claimed invention from that taught by the cited prior art.

With regard to Claim 13, Shigematsu teaches a semi-insulating substrate (10) comprising indium phosphide (InP). See column 4, line 52.

With regard to Claim 14, a further difference between Shigematsu and the claimed invention is the arms of the emitter contact being generally rectangular, having respective center points, of approximately equal length and intersect at their respective center points. Hébert discloses a high-frequency bipolar transistor structure, which includes an emitter (1) having a metal contact, wherein the metal contact comprises a cross-shaped structure (column 6, lines 5-37 and figures 5 & 6) comprising arms which are generally rectangular, have respective center points, are of approximately equal length and intersect at their respective center points. Therefore, it would have been an obvious modification to someone with ordinary skill in the art, at the time of the invention, to modify the structure as taught by Shigematsu to include arms of the emitter contact

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being generally rectangular, having respective center points, of approximately equal length and intersect at their respective center points, as suggested by Hébert, in order to yield lower emitter resistances (column 6, lines 37-41).

With regard to Claim 15, Shigematsu teaches a sub-collector (12) comprising indium gallium arsenide (InGaAs). See column 4, line 51.

With regard to Claim 16, Shigematsu teaches a collector (14) comprising indium gallium arsenide (InGaAs). See column 4, lines 52-54.

With regard to Claim 17, Shigematsu teaches a base (16) comprising indium gallium arsenide (InGaAs). See column 4, lines 54-55.

With regard to Claim 18, Shigematsu teaches a base (16) comprising indium gallium arsenide (InGaAs) and having a base contact comprising gallium arsenide antimonide (GaAsSb). See column 4, lines 64-65.

With regard to Claim 19, Shigematsu teaches an emitter (18) comprising indium phosphide (InP). See column 4, lines 55-56.

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Conclusion

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edgardo Ortiz whose telephone number is 571-272-1735. The examiner can normally be reached on Monday-Friday (1st Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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A.U. 2815
3/13/04


ALLAN R. WILSON
PRIMARY EXAMINER